

This report describes the results of the 1999-2000 Monitoring Program that was conducted in compliance with the Program's NPDES Municipal Stormwater Permit No. CAS614004. Elements of the Monitoring Program consisted of land use station monitoring, mass emission station monitoring, and the Critical Source/BMP Monitoring Study. The Critical Source/BMP Monitoring Study is an ongoing study that is scheduled to be completed in the 2000-2001 storm season. The following are the principal conclusions and recommendations from this work.

5.1 OBJECTIVES ACHIEVED IN 1999-2000

The land use monitoring was conducted at seven stations and included flow composite sample data collected during 75 station events through March 8, 2000. The storm of April 17, 2000 is not included in this report. The mass emission monitoring was conducted at 5 stations and consisted of 47 station events. Some grab sample data were also obtained at the mass emission stations. Generally, sampling activities were conducted according to plan, and attempts were made to capture as many storms as possible.

Monitoring at the land use stations and mass emission stations included a broad constituent suite including bacteria, metals, organics, major ions, and nutrients. The laboratory analytical efforts achieved detection limits (DL) as required by the Permit for all constituents, and achieved DLs that were lower than Permit requirements for many analytes, particularly for constituents of concern. Lower DLs are beneficial for two reasons: 1) to increase the probability of detection of potentially harmful substances at the concentrations of concern, and 2) to enhance the information value of the data by improving the quality of the data sets and allowing for more rigorous statistical analyses and data interpretation techniques. Thus, the major objective of runoff characterization at mass emission and land use catchments was achieved.

5.2 MASS EMISSION PROGRAM CONCLUSIONS

Malibu Creek had noticeably higher concentrations of some nutrients, specifically nitrate, total phosphorus, and dissolved phosphorus, as well as total dissolved solids.

Both total and fecal coliforms exhibited higher means and greater variability in the Los Angeles River. The San Gabriel River had the smallest amount of variability in fecal enterococcus.

Concentrations were similar among stations for a given metal. In other words, no station appeared to "cleaner" or "dirtier" than any other with respect to metals.

TSS had a high median concentration at the Sawpit Creek station that may be the result of upstream modifications to Sawpit Dam.

There were several individual exceedances of water quality objectives, either of the California Toxic Rule or of the Ocean Plan (or of both), for metals; and in fact, total copper, dissolved copper, total lead, and dissolved lead each had at least one seasonal mean or median exceed an objective.

5.3 LAND USE PROGRAM CONCLUSIONS

The median pH values were visibly different between catchment types, and this trend is also reflected in the median concentrations of bicarbonate. Runoff from the vacant catchment had high pH (8.0) and high alkalinity (median of 207 mg/l), while runoff from the light industrial, transportation, mixed residential, and high density residential stations had lower median pH values (6.8, 6.7, 6.7, and 6.8 respectively) and lower median alkalinity concentrations (27, 19, 17 and 19 mg/l respectively). The educational and multiple family residential stations fell in

between these two extremes with median pH values of 7.2 and median alkalinities of 48 and 49 mg/l respectively.

Hardness is also an important variable of water quality because it diminishes the potential of dissolved metals to cause toxicity to aquatic life. Median hardness concentrations follow the alkalinity pattern: high (192 mg/l) at the vacant station; low in the light industrial (26 mg/l), transportation (29 mg/l), mixed residential (20 mg/l), and high density residential stations (20 mg/l); and in between (56 and 64 mg/l) at the educational and multiple family residential stations.

Total suspended solids (TSS) measurements reflect the amount of sediment in the water. Sediment is a constituent of concern because of the potential to adversely affect the aquatic habitat and also cause sediment accumulation that ultimately may require dredging. Sediment also may be a carrier of other chemicals that have a tendency to adsorb to particulate matter. TSS results overlapped substantially among the different land uses, however the vacant station had the highest median for TSS (308 mg/l) being approximately twice as high as the next highest median (137 mg/l for educational). The high median concentration may be the result of upstream modifications to Sawpit Dam.

Metals in stormwater runoff can be of concern because some metals are toxic to aquatic organisms and some can bio-accumulate in the tissues of aquatic organisms (e.g. fish and clams) and be a human health concern. Total and dissolved copper concentrations overlapped among the different land uses, however the dissolved copper median for the transportation station (26.6 µg/l) was more than twice as high as the next highest median (9.2 µg/l) for light industrial). Dissolved copper generally exceeds the 3.1 µg/l California Toxics Rule guideline while total copper exceeds the Ocean Plan guideline more frequently in the transportation, light industrial, and educational stations. Total lead results are fairly consistent among land uses. Dissolved and total zinc exhibit similar patterns; there is substantial overlap among the different land uses although the mean and median for the light industrial station is highest in each case.

5.4 CRITICAL SOURCE PROGRAM CONCLUSIONS

In general, metals concentrations were highest at the fabricated metals sites and lowest at the motor freight sites. Total and dissolved copper medians at the fabricated metal control sites (218 and 97 µg/l, respectively) were an order of magnitude higher than those at the motor freight sites (3 and 9 µg/l respectively). The highest concentrations of total and dissolved lead occurred at the fabricated metal control sites (medians of 109 µg/l and 42 µg/l, respectively) while there were “no meaningful” median values for the motor freight sites. The highest dissolved zinc concentration was observed at the auto repair test sites (median of 229 µg/l) as compared with the auto repair control sites (median of 56 µg/l). Total zinc had a median of 299 µg/l at the fabricated metal test sites and 95 µg/l at the auto repair control sites. Dissolved nickel had a median of 18 µg/l at the fabricated metal control sites, and the median of dissolved nickel was not meaningful at the motor freight sites.

5.5 RECOMMENDATIONS

The Permit allows the discontinuation of monitoring at a land use station for specific constituents once the event mean concentration (EMC) is derived at the 25% error rate. We used the mean standard error as a substitute for error rate as mutually agreed upon with the RWQCB (Swamikannu, 1999).

Of 108 station-constituents under investigation, 24 of them had an EMC with a mean standard error higher than 25%. In other words, there were 24 station-constituents which had a standard error (standard deviation of the mean) larger than 25% of their corresponding mean concentrations. These station-constituents must continue to be monitored under the current Permit. The remaining 84 station-constituent combinations met the criterion and it is recommended that monitoring be discontinued for these constituents at the associated stations.